CLMPTO

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EG

1. (Amended) A method for transmitting a BFDM/OM biorthogonal multicarrier signal characterized in that it implements a transmultiplexer structure providing:

a modulation step, by means of a bank of synthesis filters, having 2M parallel branches, $M \geq 2$, each fed by source data and each comprising an expander of order M and filtering means;

a demodulation step, by means of a bank of analysis filters, having 2M parallel branches, each comprising a decimator of order M and filtering means, and delivering representative data received from said source data,

said filtering means being derived from a predetermined prototype modulation function.

2. The transmission method according to claim 1, characterized in that said filtering means of said bank of synthesis filters and/or of said bank of analysis filters are grouped as a polyphase matrix, respectively.

3. (Amended) The transmission method according to claim 2, characterized in that at least one of said polyphase matrices comprises a reverse Fourier transform with 2M inputs and 2M outputs.

4. (Amended) The modulating method according to claim 12, characterized in that it implements a reverse Fourier transform fed by 2M source data, each having undergone a predetermined phase shift, and feeding 2M filtering modules, each followed by an expander of order M, the outputs of which are grouped then transmitted.

5. The modulation method according to claim 4, characterized in that it delivers data s(k] such as:

$$x_m^0(n) = a_{m,n} e^{j\frac{\pi}{2}n}$$

$$x_l^1(n) = \sqrt{2} \sum_{k=0}^{2M-1} x_k^0(n) e^{-j\frac{2\pi}{2M}k\frac{D-M}{2}} e^{j\frac{2\pi}{2M}kl}$$

$$= 2M\sqrt{2}\,\mathrm{IFFT}\left(x_0^0(n), \cdots, x_{2M-1}^0(n) e^{-j\frac{2\pi}{2M}(2M-1)\frac{D-M}{2}} \right)$$

$$x_l^2(n) = \sum_{k=0}^{m-1} p(l+2kM) x_l^1(n-2k)$$

$$s[k] = \sum_{n=\left\lfloor \frac{k}{M} \right\rfloor - 1}^{\left\lfloor \frac{k}{M} \right\rfloor} x_{k-nM}^2(n)$$

with α an integer representing the reconstruction delay;

β an integer between 0 and M-1;

and [.] is the "integral part" function.

6.(Amended) The demodulating method according to claim 15, characterized in that it implements a reverse Fourier transform fed by 2M branches, themselves fed by said transmitted signal, and each comprising a decimator of order M followed by a filtering module, and feeding 2M phase shift multipliers, delivering an estimation of the source data.

7. The demodulation method according to claim 6, characterized in that it delivers data $\hat{a}_{m,n-\alpha}$ such that:

$$\hat{x}'^{2}_{l}(n-\alpha) = s[nM - \beta - l]$$

$$\hat{x}'^{1}_{l}(n-\alpha) = \sum_{k=0}^{\alpha-1} p(l+2kM)\hat{x}'^{2}_{l}(n-\alpha-2k)$$

$$\hat{x}'^{0}_{l}(n-\alpha) = \sqrt{2}e^{-j\frac{2\pi}{2M}l\frac{D+M}{2}}\sum_{l=0}^{2M-1}\hat{x}'^{1}_{l}(n-\alpha)e^{j\frac{2\pi}{2M}lt}$$

$$= 2M\sqrt{2}e^{-j\frac{2\pi}{2M}l\frac{D+M}{2}}\mathrm{IFFT}\left(\hat{x}'^{1}_{l}(n-\alpha),\cdots,\hat{x}'^{1}_{2M-1}(n-\alpha)\right)$$

$$\hat{a}_{m,n-\alpha} = \Re\left\{e^{-j\frac{\pi}{2}(n-\alpha)}\hat{x}'^{0}_{l}(n-\alpha)\right\}$$

with: D = 2.s.M + d,

wherein: s is an integer;

d is between 0 and 2M-1.

8. (Amended) The demodulation method according to claim 15, characterized in that said filtering modules are produced as one of the filters belonging to the group comprising:

transverse structure filters;

ladder structure filters; and

trellis structure filters.

9. (Amended) The modulation method according to claim 15, characterized in that said orthogonal multicarrier signal is a OFDM/OM signal.

10 (canceled)

11. (New) The method according to claim 1, characterized in that said orthogonal multicarrier signal is an OFDM/OM signal.

12. (New) The method for modulating a BFDM/OM biorthogonal multicarrier signal, characterized in that it implements a bank of synthesis filters having 2M parallel branches, $M \geq 2$, each fed by source data and each comprising an expander of order M and filtering means, said filtering means being derived from a predetermined prototype modulation function.

13. (New) The modulation method according to claim 12, characterized in that said filtering modules are produced as one of the filters belonging to the group comprising:

transverse structure filters;
ladder structure filters; and
trellis structure filters.

14. (New) The method according to claim 12, characterized in that said orthogonal multicarrier signal is an OFDM/OM signal.

15. (New) A method for demodulating a BFDM/OM biorthogonal multicarrier signal characterized in that it implements a bank of analysis filters having 2M parallel branches, each comprising an expander of order M and filtering means, and delivering representative data received from source data, said filtering means being derived from a predetermined prototype modulation function.

16. (New) Apparatus comprising:

a modulating device for modulating a BFDM/OM biorthogonal multicarrier signal, characterized by a bank of synthesis filters having 2M parallel branches, $M \geq 2$, each fed by source data and each comprising an expander of order M and filtering means, said filtering means being derived from a predetermined prototype modulation function.

17. (New) The apparatus according to claim 16, wherein the modulating device is further characterized in that it implements a reverse Fourier transform fed by 2M source data, each having undergone a predetermined phase shift, and feeding 2M filtering modules, each following by an expander of order M, the outputs of which are grouped then transmitted.

18. (New) The apparatus according to claim 16, further including a demodulation device for demodulating a BFDM/OM orthogonal multicarrier signal characterized by:

a bank of analysis filters having 2M parallel branches, each comprising an expander of order M and filtering means, and delivering representative data received from source data, said filtering means being derived from a predetermined prototype modulation function.

19. (New) The apparatus according to claim 20, wherein the demodulating device is further characterized in that it implements a reverse Fourier transform fed by 2M branches, themselves fed by said transmitted signal, and each comprising a decimator of order M followed by a filtering module, and feeding 2M phase shift multipliers, delivering an estimation of the source data.

20. (New) A demodulation device for demodulation a BFDM/OM biorthogonal multicarrier signal characterized by:

a bank of analysis filters having 2M parallel branches, each comprising an expander of order M and filtering means, and delivering representative data received from source data, said filtering means being derived from a predetermined prototype modulation function.

21. (New) The demodulation device according to claim 20, further characterized in that it implements a reverse Fourier transform fed by 2M branches, themselves fed by said transmitted signal, and each comprising a decimator of order M followed by a filtering module, and feeding 2M phase shift multipliers, delivering an estimation of the source data.